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(54) Aerosol dispensing device

(57) An aerosol dispenser which comprises of a body including a mouthpiece for inhalation of a substance. The substance is stored in a container, which has a depressable outlet, in a pressurised gaseous or liquid form. The outlet tube releases the dose when depressed towards the container. The depression acts on a depression spring; this is resisted by a pneumatic actuator when an actuator chamber is closed. On compression of the sting the dispenser is cocked; when it is compressed for cocking there are means for the air to escape from the chamber. There is an opening into the chamber-this is controlled by a breath actuable valve. This comprises a valve inlet; a valve outlet that is connected to the port; these are connected by a flexible tube which can be in two positions-in the closed position it is kinked and in the open position it is un-kinked. There is a movable member (movably mounted in the body), that is connected to the valve inlet, which moves the tube to control the kinking of the tube. When the movable member is in its rest position the tube is kinked and when the movable member is moved towards the orifice on inhalation the tube is unkinked-this allows air to enter the chamber, the spring acts and releases the dose in the container.

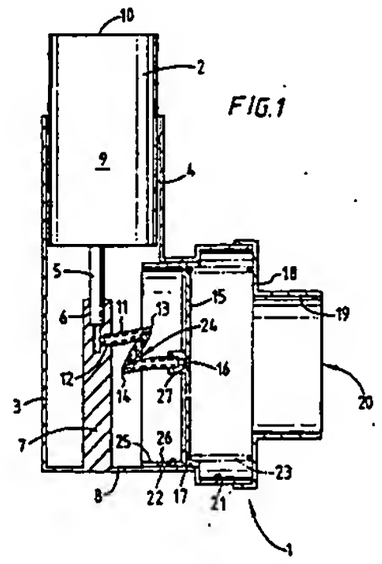

FIG.1

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Description

[0001] The present invention relates to a dispenser, particularly though not exclusively for dispensing aerosol or powder borne medicaments.

[0002] As used herein, "kinking" in respect of a tube means bending the tube to such extent that it collapses on itself, closing its internal passage

[0003] It is well known to administer medicines, for instance for asthma, from a dispenser adapted to provide a metered dose under gas pressure. For satisfactory administration, the patient should inhale the medicine into his/her lungs. This is eased if the dispensing is in phase with the patient's inhalation. Various dispensers exist which are actuated by the act of inhalation.

[0004] A difficulty with breath actuated dispensing is that the force available from the act of inhalation is very small, which renders simple, reliable actuation difficult. Generally the dispenser is cocked by the application of a much greater force than can be achieved by inhalation, and the inhalation force is used to release the dose. This calls for a mechanism with several parts.

[0005] In my earlier patent No. 2,233,236, I described an aerosol medicament dispensing device in which a metered dose is received into a storage chamber and released therefrom by a breath actuated valve.

[0006] Further in another earlier application No. PCT/GB91/02118 - WO 92/09323, I have proposed another aerosol medicament dispensing device in which a preload for dispensing from the aerosol is applied and resisted by pneumatic force. The pneumatic force is released by a breath actuated valve.

[0007] In the prior art is US Patent No 3,187,748, entitled "Inhalation actuated aerosol device". This employs a breath actuated vane for controlling valves for release of pressurised medicaments from a container to an opening at a mouthpiece. Two valves are arranged between the container and the opening. These have tubes which are opened and closed by pinching as opposed to kinking.

[0008] The object of my present invention is to provide a simpler alternative to my earlier dispensers, by providing a simple breath actuatable valve which can be incorporated therein.

[0009] According to the invention there is provided a dispenser for a gaseous, gas borne or droplet substance, the dispenser including:

- a body including a mouthpiece with an inhalation/insufflation orifice at its distal end;
- a source of the substance, in the body, in pressurised gaseous or liquid form of the type having a container and a depressable outlet tube which releases a dose on depression towards the container;
- depression means for releasing a dose, the depression means including:
  - a depression spring arranged to act on the source for releasing a dose;
  - a pneumatic actuator for resisting the action of the spring when a chamber of the actuator is closed;
  - a port opening into the chamber;
  - means for compressing the spring to cock the dispenser; and
  - non-return means for allowing air to escape from the chamber as it is compressed for cocking; and
- a breath actuable valve, for controlling the port into the chamber, comprising:
  - a valve inlet;
  - a valve outlet, connected to the port;
  - a flexible tube extending between the inlet and the outlet, the tube having a portion which is movable between a closed position in which the tube is kinked for closure of the valve and an open position in which the tube is un-kinked for opening of the valve;
  - a movable member, movably mounted in the body and connected to the valve inlet for movement therewith, for moving the movable portion of the tube to control the kinking of the tube, the tube being kinked to an obdurating extent when the movable member is in its rest position and unkinked when the movable member is moved towards the orifice on inhalation for release of the contents of the container by allowing air to enter the chamber and the spring to act to release the dose.

[0010] In this embodiment, the movable member is preferably a flap pivotably mounted in the body and the spring is a torsion spring acting about the pivot of the flap in body.

[0011] Whilst in some embodiments the unkinking of tube will involve at least partial straightening of it, it should be noted that the flexible tube will in most cases allow flow whilst still curved but not kinked.

[0012] The tube itself may be a length of plastics material tube. Preferably it is permanently shaped to predetermine the position of the obturating kink(s).

[0013] In certain embodiments, the tube has a single kink when the movable member and the movable portion of the tube are in their closed position, the tube then preferably having a V or L configuration. In other embodiments, the tube has a pair of kinks when closed, the tube then preferably having a Y, M or Z configuration.

[0014] The movable portion of the tube can be an end portion of the tube, connected to or providing the inlet or the outlet of the valve, in which case the end portion of the tube can be movable axially to kink and un-kink the tube, i.e. to close and open the valve, or the end portion of the tube can be movable angularly to kink and un-kink the tube.

[0015] Alternatively the movable portion of the tube can be a middle portion of the tube, between end portions connected to or providing the inlet and the outlet of the valve.

[0016] Whilst the dispensers may find use for continuous dispensing, normally they will be used for dispensing metered doses. These may be released by the source of gas or liquid in measured doses. However it is envisaged that the source may be arranged to release into a space at least partially limited by an obturating kink to measure the dose.

[0017] To help understanding of the invention, embodiments thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 5 is a cross-sectional view of a dispenser according to the invention.

[0018] Turning to Figure 5, the dispenser 201 there-shown includes an aerosol medicament container 202 in a body 203. The aerosol outlet tube 205 is received in a socket 206 in block 207 upstanding from the floor 208 of the body. A mouthpiece 219 is provided adjacent the block 207. The opposite end of the container is received in a short sleeve/piston 204, which is arranged as a piston in a second sleeve/cylinder 2041. The latter is moulded integrally with the body 203. A spring 2042 urges the piston out of the cylinder, whilst a slide knob 2043 is provided for urging the piston inwards. The piston is moulded with an integral lip 2044, which allows air in the cylinder to pass out on inwards movement of the piston, but does not allow air into the cylinder under the action of the spring 2042. Thus whilst the cylinder remains closed, after cocking of the dispenser by pushing of the knob 2043 upwards, the piston 204 is pneumatically held in position until released, whereupon the action of the spring forces the container down causing movement of the outlet tube inwards of the container for dispensing of the aerosol medicament.

[0019] Pivotally mounted on the end 2045 of the cylinder 2041, is a flap 215, which is urged to its position shown in Figure 5 by a torsion spring 223, mounted on a pivot pin 2231. A tube 211 with kinks 213,214 is adhered at one end into an opening 212 in the cylinder end 2045. The other end of the tube is clipped 2151 to the flap 215. In practice to accommodate the tube, the kink 213 may be a bend not completely obturating the tube, but with the kink 214 obturating the tube in the Figure 5 position.

[0020] The top of the body 203 has an air inlet opening 231 and an air passage 232 is provided to connect the mouthpiece to the space233 on the side of the flap 215 opposite from the inlet 231.

[0021] On cocking of the dispenser as described above, the kink valve 224 prevents air from entering the cylinder, despite the action of the spring 2042. On inhalation through the mouthpiece, a pressure differential is developed across the flap 215, pivoting it down against its spring 223. This movement unkinks the tube 211 sufficiently for air to pass through it which allows the spring 2042 to actuate dispensing from the container.

[0022] The invention is not intended to be restricted to the details of the above described embodiments. The dispenser may be a dry powder dispenser either having means for dispensing a pre-metered dose of powder or metering a dose of powder, either of which is fluidised for inhalation by a dose of gas released by a kink valve operated by a piston or other vane in the manner of the described embodiments. It should also be specifically noted that the invention can be used in nasal insufflation devices as well as mouth inhalation devices. Again it can be envisaged that a mouthpiece cap or a separate clip can be pivoted onto the end of the canister to hold it depressed immediately prior to inhalation.

201. the dispenser
202. aerosol medicament container
203. body
204. short sleeve/piston
2041. second sleeve/cylinder
2042. spring
2043. slide knob
2044. integral lip
2045. end
205. aerosol outlet tube
206. socket
207. block
208. floor
211. tube
212. port into cylinder
213. kink
214. kink
215. flap
2151. clip
219. mouthpiece
223. torsion spring
2231. pivot pin
224. kink valve
231. air inlet opening
232. air passage
233. space

Claims

1. A dispenser for a gaseous, gas borne or droplet substance, the dispenser comprising:
   - a body (203)including a mouthpiece (219) with an inhalation/insufflation orifice (20) at its distal end;
   - a source of the substance, in the body, in pressurised gaseous or liquid form of the type having a container (202) and a depressable outlet tube (205) which releases a dose on depression towards the container;
   - depression means for releasing a dose, the depression means including:
     - a depression spring (2042) arranged to act on the source for releasing a dose;
     - a pneumatic actuator for resisting the action of the spring when a chamber of the actuator is closed;
     - a port opening into the chamber;
     - means (2043) for compressing the spring to cock the dispenser; and
     - non-return means (2044) for allowing air to escape from the chamber as it is compressed for cocking; and
   - a breath actuable valve (224), for controlling the port (212) into the chamber, comprising:
     - a valve inlet;
     - a valve outlet, connected to the port;
     - a flexible tube (211) extending between the inlet and the outlet, the tube having a portion which is movable between a closed position in which the tube is kinked (213:214) for closure of the valve and an open position in which the tube is un-kinked for opening of the valve(224);
   - a movable member (215), movably mounted in the body and connected to the valve inlet for movement thereof, for moving the movable portion of the tube to control the kinking of the tube (211), the tube being kinked to an obdurating extent when the movable member is in its rest position and unkinked when the movable member is moved towards the orifice on inhalation for release of contents of the container by allowing air to enter the chamber and the spring to act to release the dose.

2. A dispenser as claimed in claim 1, wherein the tube has a single kink when the movable member and the movable portion of the tube are in their closed position, the tube then preferably having a V or L configuration.

3. A dispenser as claimed in claim 1, wherein the tube has a pair of kinks when the movable member and the movable portion of the tube are in their closed position, the tube then preferably having a Y, M or Z configuration.

4. A dispenser as claimed in claim 1, claim 2 or claim 3, wherein the movable portion of the tube is an end portion of the tube, connected to or providing the inlet or the outlet of the valve.

5. A dispenser as claimed in claim 4, wherein the end portion of the tube is movable axially to kink and un-kink the tube, i.e. to close and open the valve.

6. A dispenser as claimed in claim 4, wherein the end portion of the tube is movable angularly to kink and un-kink the tube, i.e. to close and open the valve.

7. A dispenser as claimed in claim 1, claim 2 or claim 3, wherein the movable portion of the tube is a middle portion of the tube, between end portions connected to or providing the inlet and the outlet of the valve.

8. A dispenser as claimed in claim 8, wherein the movable member is a flap (215) pivotably mounted in the body.

9. A dispenser as claimed in claim 8, wherein the spring is a torsion spring (223) acting about the pivot (2231) of the flap in body.

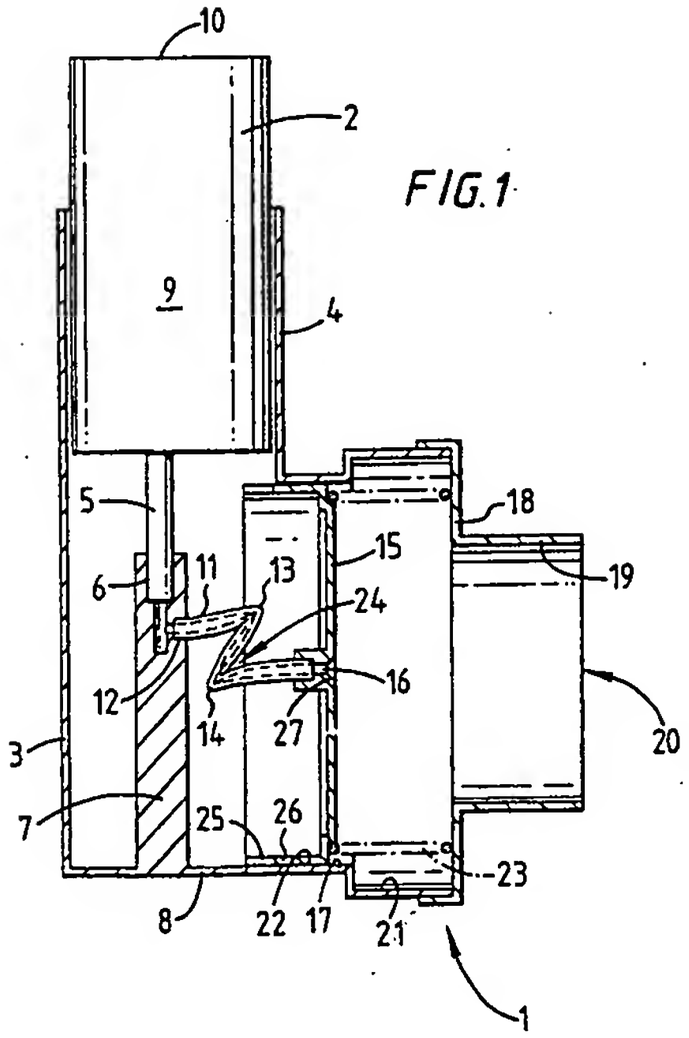


FIG.1

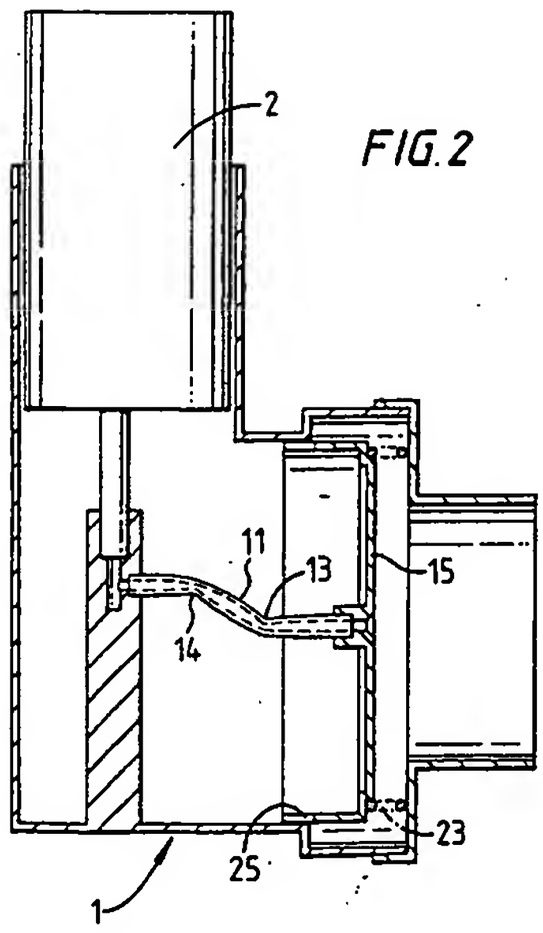


FIG.2

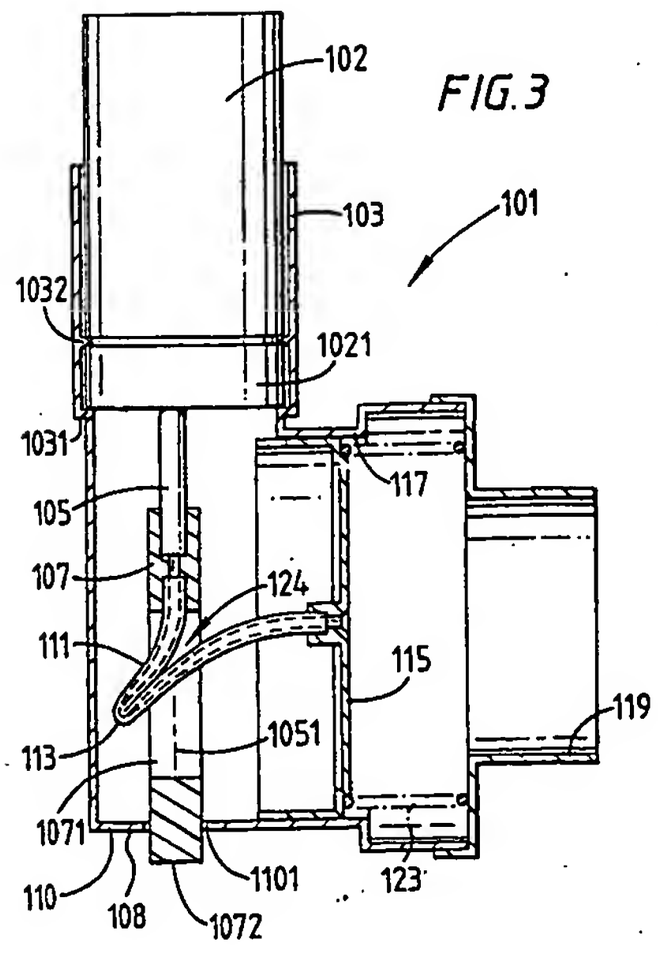


FIG.3

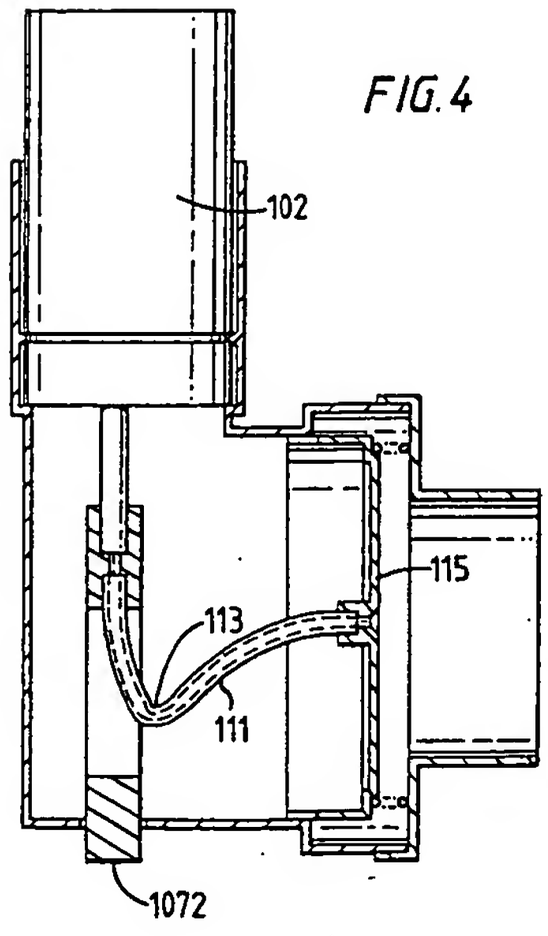


FIG.4

FIG.5

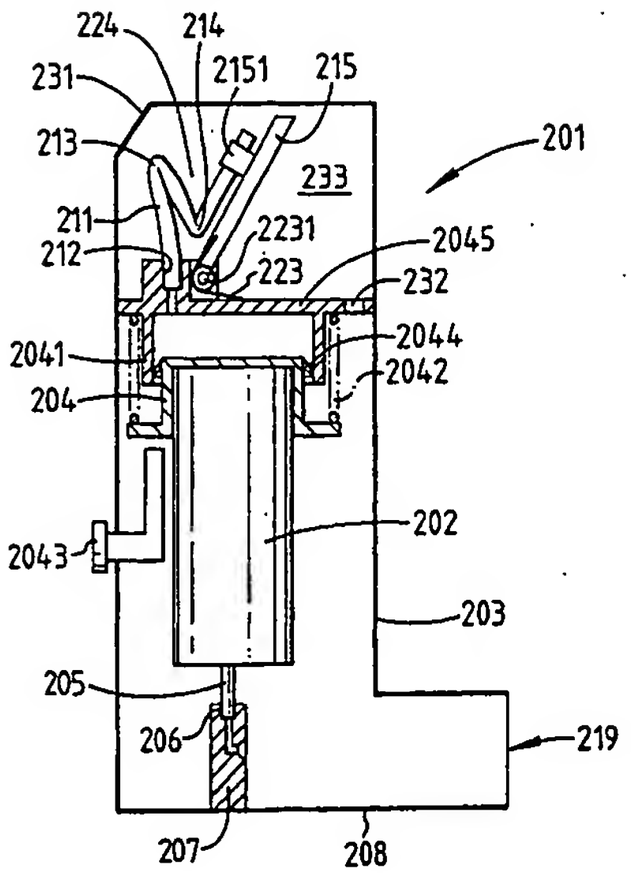


FIG.7

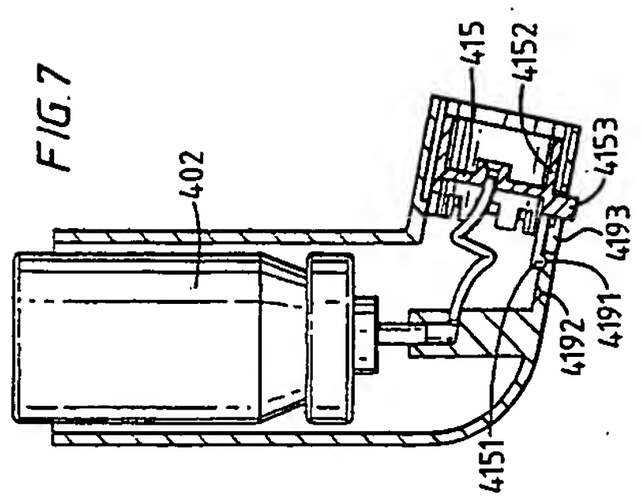
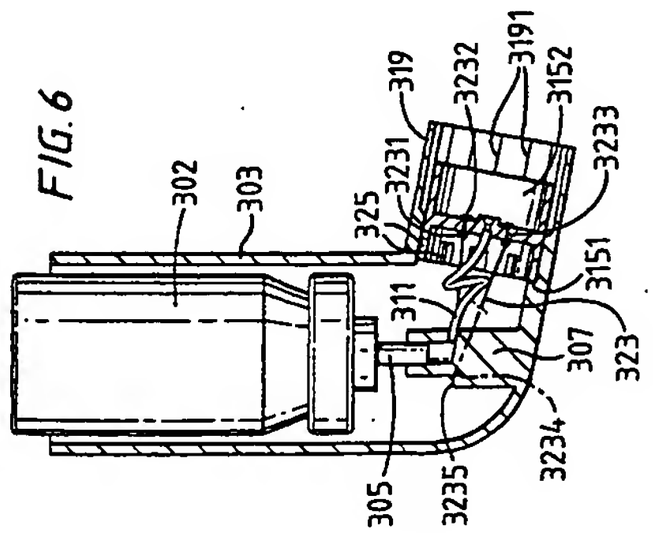


FIG.6



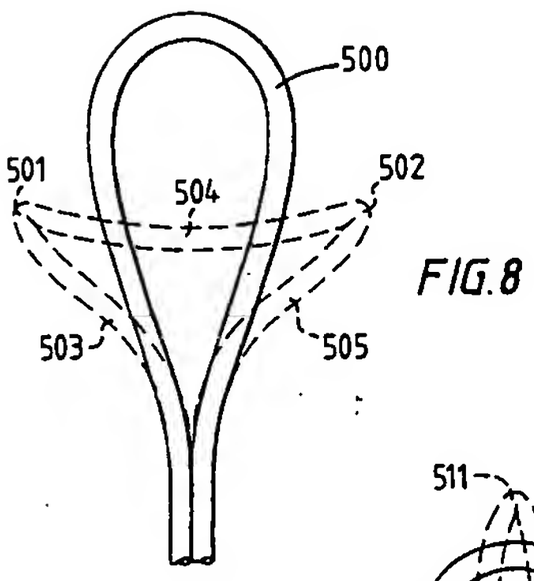


FIG.8

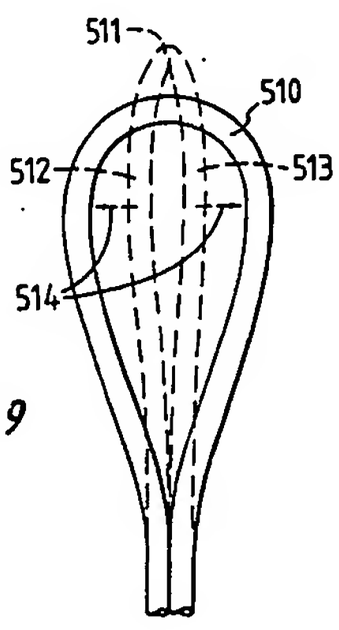


FIG.9